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REPORT OF THE OPERATIONS OF THE OIL AND GAS CONSERVATION BOARD

1969

OIL AND GAS CONSERVATION BOARD
603 SIXTH AVENUE SOUTH WEST • CALGARY 1, ALBERTA

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PREFACE

This report is the seventh edition of an annual report on the operations of the Oil and Gas Conservation Board. It is introduced with a brief discussion of the general activities of the oil and gas industry in 1969, emphasis being placed on those related to conservation. Following this is a summary of the constitution, responsibilities and functions of the Board; a discussion of its organization and staff; and a general summary of important statutory changes affecting the Board. The main section of the report deals with the responsibilities, organization and activities of the several departments of the Board and discusses the role of each in the discharge of the overall responsibilities of the Board. There is a statement of Board expenditures and revenues, comparing them with previous years and with indices of industry and Board activity. Finally, the addresses and publications of the Board and its staff for 1969 are tabulated.

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Map of Alberta Showing Oil and Gas Fields

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I THE ALBERTA OIL AND GAS INDUSTRY IN 1969

Exploration

Exploratory activity remained close to the level established in 1968. The development of new crude oil reserves continued to be centred in the Rainbow and Zama areas. Exploratory drilling resulted in additional gas bearing D-3 reef discoveries in the Strachan-Ricinus area.

The number of exploratory wells drilled increased marginally from 1,025 in 1968 to 1,035 in 1969. Total exploratory footage drilled in 1969 was 4,867,639, a decrease of 2.6 per cent from the 4,998,595 feet drilled in 1968. Accordingly, the average depth of exploratory wells dropped from 4,877 feet in 1968 to 4,703 feet in 1969. A reduced degree of success was achieved in 1969, with a proportion of successful exploratory wells of 28 per cent compared to 33 per cent in 1968.

Development

The total number of development wells drilled declined from 881 wells in 1968 to 837 wells during 1969, a decrease of 5 per cent. Successful oil wells drilled declined from 366 in 1968 to 315 in 1969, whereas the number of successful gas wells was substantially higher: 291 as compared to 235. Development footage drilled declined by some 4 per cent during 1969 to 3,872,911 feet, as compared to 4,015,513 feet drilled in 1968. The average well depth increased slightly from 4,558 feet in 1968 to 4,627 feet in 1969.

During 1969, development drilling for oil was concentrated mainly in the Virgo, Provost, Zama and Chauvin South fields. Most of the development drilling for gas occurred in the Alderson, Kaybob South and Craigend areas.

Reserves

Initial recoverable crude oil reserves increased modestly by 343 million barrels during 1969, to reach a total of 10,683 million barrels by the end of the year. The increase to remaining recoverable reserves was 63 million barrels, after deduction of 279 million barrels produced during 1969. The remaining recoverable reserves of crude oil were 7,695 million barrels as at December 31, 1969, as compared to 7,632 million barrels at the end of 1968.

Approximately three-quarters of the increase in initial reserves was attributable to new discoveries in the Rainbow and Zama areas. The appreciation of reserves in previously discovered pools was relatively small. This reflects the fact that the reserve appreciation associated with enhanced recovery schemes was largely offset by downward adjustments to the Board's previous reserve estimates for some pools.

Initial marketable gas reserves increased by about 3.1 trillion cubic feet, reaching a total of 54.9 trillion cubic feet as at December 31, 1969. Production of marketable gas in 1969 was some 1.3 trillion cubic feet; hence, remaining marketable gas reserves increased by some 1.8 trillion cubic feet to 45.2 trillion cubic feet as at December 31, 1969. This compares to 43.4 trillion cubic feet at December 31, 1968. The increase in initial reserves resulted primarily from new discoveries in the Strachan-Ricinus area and reserve additions in the Kaybob South, Alderson and Craigend areas.

Remaining reserves of propane at year end 1969 were some 702 million barrels, an increase of 111 million barrels over 1968, while remaining reserves of butane increased by some 61 million barrels to a level of 440 million barrels over the same period. Remaining reserves of pentanes plus increased by some 113 million barrels in 1969 to a level of 1,048 million barrels at December 31, 1969. Thus, total remaining reserves of natural gas liquids increased by some 285 million barrels to 2,190 million barrels as at the end of 1969. Most of the growth in reserves can be attributed to substantial increases in gas reserves in the Ferrier, Kaybob South and Strachan fields, as well as additional gas reprocessing facilities at Empress.

Remaining reserves of sulphur increased to some 165 million long tons, a rise of 25 million long tons over the 1968 level. These volumes do not include the sulphur expected to be recovered by the processing of oil sands.

Crude Oil Productive Capacity

Following the practice adopted in 1966, the Board has published an assessment of the Province's crude oil productive capacity at the end of 1969 in its Annual Reserves Report, OGCB 70-18*. The year-end estimates of each category are summarized below.

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* Reserves of Crude Oil, Gas, Natural Gas Liquids and Sulphur, Province of Alberta, December 31, 1969.

(1) Peak Value of Maximum Efficient Reservoir Capacity: some 2.28 million barrels per day, representing a decrease of some 160,000 barrels per day from the 1968 figure. The decrease is mainly attributable to different methods of estimation for major pools.

(2) Developed Well Head Capacity: some 1.59 million barrels per day, a nominal increase over 1.57 million barrels per day in 1968.

(3) Developed Capacity Adjusted for Field and Processing Facility Limitations: some 1.07 million barrels per day, a minor increase from last year's estimate.

(4) Developed Capacity Adjusted for Pipe Line System Limitations: some 1.01 million barrels per day, an increase of 117,400 barrels per day over the 1968 estimate.

After making a reduction of 5 per cent to allow for periodic operating problems, the resulting estimate of net effective provincial crude oil capacity is some 957,000 barrels per day.

Production and Markets

In 1969, average daily production of conventional crude oil rose substantially by 80,000 barrels to 765,000 barrels, an increase of some 12 per cent over 1968. The Great Canadian Oil

Sands plant production of synthetic crude oil averaged some 28,000 barrels per day, compared to 16,000 barrels per day in 1968. Pentanes plus production recorded an increase of some 17 per cent to total 102,000 barrels per day in 1969, as compared to 87,000 barrels per day in 1968.

Export demand for all types of Alberta oil exceeded Canadian demand for the first time in 1969. Alberta exported to the United States some 461,000 barrels per day of oil during 1969, an increase of 92,000 barrels per day or some 25 per cent over the 1968 average. Demand in Canada for Alberta oil amounted to 434,000 barrels per day in 1969, an increase of some 4 per cent over the 1968 level of 419,000 barrels per day. Alberta's share of the total requirements for Canadian oil west of the Ottawa Valley remained at the 1968 level of 64 per cent. Demand for Alberta oil within Alberta increased from an average of 98,000 barrels per day in 1968 to 109,000 barrels per day in 1969.

Gross production of natural gas, net of the amounts returned to formation, increased by 248 billion cubic feet during 1969 to reach a total of 1,677 billion cubic feet, a rise of some 17 per cent. Alberta marketed gas production was 1,305 billion cubic feet as compared to 1,088 billion cubic feet in 1968, an increase of almsot 20 per cent. The major portion of the marketed increase was accounted for by the Canadian markets for Alberta gas, which expanded by some 21 per cent over 1968. The amount consumed within Alberta rose from 206 billion cubic feet in 1968 to 229 billion cubic feet during 1969. Exports to the United States increased from 476 billion cubic feet in 1968 to 531 billion cubic feet in 1969, an increase of 11.6 per cent.

Substantial growth was recorded in the production of propane and butane in 1969. Production of propane rose by 15 per cent from 40,000 barrels per day in 1968 to 46,000 barrels per day in 1969; production of butane averaged 29,000 barrels per day, as compared to 26,000 barrels per day in 1968, an increase of some 12 per cent. These increases are a reflection partly of the rise in natural gas production but also of more extensive gas processing and recovery due to new plants and expansion of existing gas plants. Export markets absorbed the greater portion of the increase, while domestic markets accounted for the balance.

Similarly to LPG's, production of sulphur increased significantly in 1969, rising by 664,000 long tons to 3,654,000 long tons as compared to 2,990,000 long tons in 1968, an increase of some 22 per cent. The additional production was mainly attributable to the installation of new or enlarged extraction facilities at several existing plants and the first year of full operation at the Kaybob South plant. Shipments of sulphur to Canadian and United States markets increased by some 6 per cent from the 1968 level of 1,322,000 long tons to 1,403,000 long tons in 1969. Offshore shipments rose by some 31 per cent from 888,000 long tons in 1968 to 1,165,000 long tons in 1969. In total, production of sulphur exceeded deliveries by 1,086,000 long tons. Consequently inventory levels increased substantially in 1969, following the trend of 1968.

Conservation Activity

Developments in Oil

The new proration plan was fully implemented May 1, 1969. The minimum allowance for all light and medium gravity crude oil pools became the floor allowance, replacing the operating economic allowance which applied prior to May 1, 1969.

About 40 applications for new enhanced recovery schemes were considered during 1969. Of these the most significant was the solvent flooding of the Wizard Lake D-3 A Pool. A study of some 300 pools in the Rainbow and Zama areas indicated the need to obtain better definitions of reservoir characteristics in many pools, prior to implementing new schemes. Outside the Rainbow-Zama area, studies were initiated in some 20 pools of which approximately two-thirds appeared suitable for enhanced recovery operations. With respect to the oil sands deposits, some decline in experimental work was evident during the latter part of 1969.

Significant developments in the oil sands included the hearing of an amended application by Atlantic Richfield Company, Cities Service Athabasca, Inc., Imperial Oil Limited and Royalite Oil Company, Limited for approval of a commercial plant producing 50,000 barrels per day of synthetic crude oil and 30,000 barrels per day of specialty products. The application was approved and reported upon in OGCB Report 69-C*.

Developments in Gas and Propane

In February, 1969, the Board reported on the 1968 application of Alberta and Southern Gas Co. Ltd. in OGCB Report 69-A**. As a result of the Board's recommendations, a permit was issued to Alberta and Southern authorizing the removal of an additional 1.2 trillion cubic feet of gas from the Province over the period ending October 31, 1993. During 1969, the Board heard further applications relating to gas removal permits by Trans-Canada Pipe Lines Limited, Consolidated Natural Gas Limited and Alberta and Southern Gas Co. Ltd. The Board reported on the Trans-Canada application in OGCB Report 69-F*** and, with the approval of the Lieutenant Governor in Council, issued a permit to Trans-Canada authorizing the removal of an additional 2.2 trillion cubic feet of gas from the Province over a 25-year period ending October 31, 1994. The Board reported on the Consolidated application in OGCB Report 69-G**** and subsequently issued a permit to Consolidated authorizing the removal of 1.5 trillion cubic feet of gas from the Province over a 25-year period ending December 31, 1995. The report on the application by Alberta and Southern was being prepared at year end.

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* Report of an Application of Atlantic Richfield Company, Cities Service Athabasca, Inc., Imperial Oil Limited and Royalite Oil Company, Limited. September, 1969.

** In the Matter of an Application of Alberta and Southern Gas Co. Ltd. under The Gas Resources Preservation Act, 1956. February, 1969.

*** In the Matter of an Application of Trans-Canada Pipe Lines Limited under The Gas Resources Preservation Act, 1956. November, 1969.

**** In the Matter of an Application of Consolidated Natural Gas Limited under The Gas Resources Preservation Act, 1956. December, 1969.

The Board considered an application from the Alberta Division of the Canadian Petroleum Association concerning policies and procedures relating to the removal of gas from the Province. The decision, published in OGCB Report 69-D*, involved changes to the Board's previous methods of appraisal which would entail, at the present stage of development of the Province's reserves, more reliance on reserves yet to be discovered to meet the Province's future gas requirements. The Board also decided to hold a hearing once every three years commencing in 1970 to determine the Province's long term requirements.

The Board also considered an application from Dome Petroleum Limited and Trans-Canada Grid of Alberta, Ltd. for removal of propane from the Province. Following publication of OGCB Report 69-E**, a permit was issued authorizing the removal of 39.5 million barrels of propane from the Province over a 17-year period commencing January, 1971.

Gas conservation facilities were installed in the Alix, Bantry, Clive, Ferrier, Kaybob South, Olds and Westward Ho fields and extended in several other fields including Pembina and Swan Hills.

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* Report and Decision on Review of Policies and Procedures for Considering Applications under The Gas Resources Preservation Act, 1956. October, 1969.

** In the Matter of an Application for a Permit Authorizing the Removal of Propane from the Province of Dome Petroleum Limited and Trans-Canada Grid of Alberta, Ltd. under The Gas Resources Preservation Act, 1956. October, 1969.

Several new gas processing plants were considered and approved by the Board, including plants in the Brazeau, Burnt Timber, Gold Creek, Greencourt, Kaybob South, Mitsue, Provost, Quirk Creek and Whitecourt-Blue Ridge areas. In addition, the Board approved an application by Dome Petroleum Limited and Trans-Canada Grid of Alberta, Ltd. to build a reprocessing plant for part of the gas removed from the Province at Empress. Expansions to several existing plants were also approved.

Government Revenue

Total Government revenue from oil and gas mineral rights increased from $250 million in 1968 to some $277 million in 1969. The 1969 total reflects rental payments of $61 million, an increase of $6 million from 1968; royalty payments of $113 million, an increase of $12 million and revenue from Crown Reserve sales of $102 million, an increase of $9 million.

Industry Revenue

Revenue to the oil and gas industry from sales during 1969 totalled $1,131 million, an increase of some 10 per cent over the 1968 level of $1,026 million. Sales of crude oil and pentanes plus continued to yield the largest revenue and rose by some 12 per cent from $745 million in 1968 to $838 million in 1969. In proportionate terms, this increase is somewhat lower than the increase in the volume of production and indicates a slight decrease in the average price of crude oil and equivalent during 1969. Revenue from sulphur decreased from $76 million in 1968 to $59 million in 1969. This 23 per cent decrease, compared to an increase of some 16 per cent in the volume of sales, follows from a marked decrease in the average selling price of sulphur. The total revenue from sales of gas, propane and butane rose by some 14 per cent, with gas revenue amounting to $200 million, a 17 per cent rise, propane totalling $21 million, 2 per cent less than in 1968, and butane remaining at the 1968 level of $13 million. Minor reductions occurred in the average prices of propane and butane during 1969.

II RESPONSIBILITIES AND FUNCTIONS OF THE BOARD

The Board is established by The Oil and Gas Conservation Act, 1969 for the purpose of administering that Act. It is also charged with the administration of The Gas Resources Preservation Act, 1956, and The Turner Valley Unit Operations Act. Additionally, it may be called upon to supply information and advice to the Department of Mines and Minerals, particularly in connection with applications for permits under The Pipe Line Act, 1958. Finally, the Board, like the Public Utilities Board, may refer applications that touch on matters in part within the purview of each of the Boards to the Gas Utilities Board, of which the Chairman of the Oil and Gas Conservation Board is a member and to which the Board gives technical and other assistance in connection with applications referred by it.

The purposes of The Oil and Gas Conservation Act, 1969, are to effect the conservation and prevent the waste of the Province's resources in oil, gas and crude bitumen (the hydrocarbon bearing mixture extracted from oil sands), to secure the observation of safe and efficient field practices, to afford each owner of oil and gas the opportunity of obtaining his share of the production of any pool, and to provide for the recording and dissemination of information regarding oil, gas and crude bitumen resources in the Province. The Board must see that, in the light of sound engineering and economic principles, oil and gas field operations are so conducted that wells are properly located, spaced, drilled, equipped and produced so that the recovery of oil or gas from a pool is not lessened and reservoir energy is not improperly dissipated, that enhanced recovery techniques are used where suitable, that waste of gas is minimized, that proper storage facilities are used, and that oil or gas is not produced in excess of demand or of storage and transportation facilities. The Board is required to see that oil and gas field operations are so conducted that any resulting pollution to the atmosphere or the surface is controlled.

Under The Oil and Gas Conservation Act, 1969, the Board also is charged with the examination of schemes, either of an experimental or commercial character, for obtaining production from oil sands. In this the Board is concerned with the conservation and prevention of waste of these resources, the control of pollution, and orderly development of oil sands so that the production will supplement but not displace conventional oil.

To carry out these functions the Board employs appropriate personnel, including engineers, geologists and others. It maintains a head office in Calgary and area offices serving major oil and gas regions. The Board issues regulations and orders pertaining to drilling and producing operations; considers applications by operators; has its staff conduct inspections and make studies; conducts investigations, holds hearings and prepares reports; and collects, summarizes and publishes various data.

The Board also, under Part 11 of The Oil and Gas Conservation Act, 1969, assesses and taxes oil and gas properties to obtain a revenue to cover one-half of its expenses under the Act.

The Turner Valley Unit Operations Act empowers the Board, upon application, to order a part of the Turner Valley Rundle Pool to be operated as a unit. Under this Act, four oil productive and one gas productive units have been established encompassing substantially all of the Turner Valley Field.

The purpose of The Gas Resources Preservation Act, 1956, is to provide for the effective utilization of the gas resources of the Province, having regard to the present and future needs of persons within the Province. For this purpose, the Board must from time to time determine the volumes of established reserves of gas and propane in the Province and the trends in growth and discovery of gas and propane reserves and the present and future needs for gas and propane within the Province. Applications for permits for the removal of gas or propane from the Province are considered in the light of such determinations and may be granted if it is in the public interest to do so.

III ORGANIZATION AND STAFF

The Board consists of a Chairman, Deputy Chairman and Board Member, each appointed for a five year period by the Lieutenant Governor in Council. The term of office is continued at the Pleasure of the Lieutenant Governor in Council.

The Board's senior advisers are its Chief Engineer and Solicitor. They provide technical and legal advice directly to the Board and, when appointed for the purpose, function as acting Board Members. An Applications Advisory Group under the Chairmanship of the Chief Engineer and including the Board Solicitor and the Managers of the Gas, Oil and Development Departments advises the Board on routine applications. Also the Managers of these three departments serve with other senior staff as examiners at hearings.

The organization of the Board is presented in chart form on the inside of the back cover to this report. It shows the overall organization of the Board including the various Departments. The departments vary in size, ranging from 68 employees in the Development Department to five in the Personnel Department. Each Department Manager is responsible to the Board for carrying out the functions assigned to his department as summarized in Section V of this report.

In 1969 the Board maintained five area offices staffed by engineers and technicians whose basic responsibility is to inspect drilling and producing procedures in oil and gas fields. Area offices are located at Red Deer, Black Diamond, Medicine Hat, Drayton Valley and Edmonton. The Engineer or Area Supervisor in charge of each area office is responsible to the Assistant Manager, Field Operations who, in turn, is responsible to the Manager of the Development Department. The Board also maintains a Chemical Laboratory on the University of Alberta campus and a Core Storage Center in Calgary.

In general, the Board's Development Department is responsible for the drilling and production practices of the industry, and the Oil and Gas Departments are responsible for ensuring maximum conservation from oil and gas pools as discovered and developed. The Gas Department is additionally responsible for assisting the Board in controlling the volume of gas and propane removed from the Province. The Geology Department, the Data Processing Department and the Chemical Laboratory provide technical assistance directly to the Board and to the three main engineering departments - Development, Gas and Oil. The Economics Department and the Production Accounting Division of the Accounting Department provide economics and statistical data and studies. The Economics Department also administers the crude oil proration plan with the assistance of the Oil Department. The Office Services Department, the Personnel Department and the Financial Accounting Division of the Accounting Department perform services for the Board organization a a whole. The Core Storage Center provides Board personnel and indu try representatives with pertinent geological date of the Province.

The Board had an approved staff complement of 289 employees at the end of 1969, representing an increase of nine during the year. The complement is distributed as follows: 236 located in Calgary, 48 in the Board's area offices, and five in the Chemical Laboratory in Edmonton. Of the employees on staff at year end, 52 were Engineers or Geologists. In 1969, 49 employees had each completed more than 15 years' service, and twelve of these had completed more than 20 years' service.

During 1969 the Board held three on-premises courses to further its Employee Development Program; these were the Field Training Course in June, the Supervisory Training Course, and the Board Reservoir Engineers' Winter Course. The Board also provided financial assistance to approximately 100 employees who attended off-premises courses during the year. In addition, the Board sponsored the attendance of 63 employees at various local, national and international conferences during the year. The Board's Technical Proficiency Program, designed to maintain and improve the proficiency of technical and professional staff, was continued this year with increasing success.

As a result of expanding use of the Board's computer system, three in-company continuing courses and several other shorter courses were presented to Board employees to expand their knowledge of computer technology. A Fortran programming course was presented by Board employees to eleven other employees.

Staff terminations due to resignations, retirement, continuing education, and other reasons totalled 87 in 1969. This resulted in a turnover rate of 30%, compared with a turnover rate of 21% in 1968. Over half the total turnover occurred in the the junior clerk and stenographer categories.

IV LEGISLATIVE CHANGES

Statutes

The Oil and Gas Conservation Act which had been in force since 1957, was replaced by The Oil and Gas Conservation Act, 1969, which came into force on July 1, 1969. The enactment of the new Statute substantially completed a three-year review of the legislation and regulations under which the Board conducts its principal functions. In this connection it followed the establishment of the Oil and Gas Conservation Regulations in 1968. The major changes from the old Act are outlined below.

Sections 17, 18, 19 and 68 deal with the financial arrangements of the Board. Previously, a percentage of the Board's expenditures decided from time to time by the Lieutenant Governor in Council was raised by taxation and the balance by grant from the Government. This traditionally had worked out so that approximately half of the Board's expenses were paid by the Crown and half by industry. The sections referred to state that 50 per cent of the Board's estimated expenditures will be supplied by the Government, and the other 50 per cent raised by taxation. To complement this, the oil and gas properties of the Crown are no longer subject to taxation by the Board.

In the old Act the Lieutenant Governor in Council was authorized to make some regulations of general application and the Board was authorized to make others. The authority to make regulations has been collected together in section 22 and the power to make them is vested in the Board. Most of the provisions of the Regulations, particularly those of substantive rather than procedural effect, are fairly well established and can be expected to be changed from time to time only to meet changing conditions. The Board's powers in other areas have been reduced as, for example, the common carrier, purchaser or processor provisions which now require the Board to hold a hearing, the compulsory enhanced recovery or gas conservation provisions which now require the Board to obtain an Order in Council, or the rateable take of gas provisions which now require the Board to hold a hearing.

Part 6 of the new Act contains provisions concerning well licences. The sections dealing with the licensee's deposit were dropped and transferred to the Regulations.

Sections 45 to 47 are additions to the Act, and deal with the suspension and shutting in of wells. These provisions had been scattered between the Act and the Regulations until they were gathered together in the 1968 Regulations.

The provisions regarding the keeping of records and the filing of monthly reports contained in sections 96, 97a, 98, 99 and 100 of the former Act, were omitted from the Statute and placed in the Regulations.

Section 110, dealing with notice of Board hearings and the rights of interested persons to cross-examine and to be heard, contains additional provisions which incorporate into the Act as far as may be the provisions of The Administrative Procedures Act.

Section 124 deals with appeals to the Appellate Division of the Supreme Court of Alberta. The new provisions restrict appeals to questions of jurisdiction and law. The old provisions permitted appeals on the basis that the order or direction was wrongly made in the case of an order requiring compulsory enhanced recovery or compulsory gas conservation. It was felt that the questions to be resolved in such cases, apart from jurisdiction or law, were either technical problems which the Board could decide or matters of policy which the Government could decide. To complement this change, such orders now require approval of the Lieutenant Governor in Council.

Regulations

During the first half of 1969 a few amendments of a routine or clarifying nature were made to the Oil and Gas Conservation Regulations. The amending provisions were in Alberta Regulation 24/69, Alberta Regulation 86/69 and Alberta Regulation 117/69.

Effective July 1, 1969, the 1968 Regulations were rescinded and replaced by new Oil and Gas Conservation Regulations by Alberta Regulation No. 183/69. The new Regulations substantially carried forward the old Regulations subject to the deletion of some provisions which were placed in The Oil and Gas Conservation Act, 1969, and the addition of some provisions which were taken from the old Oil and Gas Conservation Act.

The new Oil and Gas Conservation Regulations were amended in December, 1969 by Alberta Regulation 372/69. Part 15, being the Standards and Methods of Assessment, was completely replaced, this being the last of the Board's regulatory provisions to be dealt with in the three-year review. Further, a new section 923a was added to the Regulations dealing with the treatment of overproduction and underproduction of wells during the first three months of 1970 to permit the fullest use of production facilities during a period of high demand. Also, comparatively minor amendments were made to section 604 and section 1201, dealing with flare lines burning sour solution gas, and the data that is to appear in well names.

V DUTIES, ORGANIZATION AND MAJOR ACTIVITIES OF BOARD DEPARTMENTS

This section of the report deals with the make-up and principal activities of the nine Board departments. The technical departments are described first.

Before outlining the individual departmental activities, it is probably worthwhile to mention the overall activity in the consideration of registered applications. During 1969 the Board received 528 applications of the type which it registers individually. This volume is slightly reduced from the 546 applications filed in 1968. Such applications are those which, if approved, would result in the issuance of a Board order, approval or permit. They are exclusive of routine applications such as those for drilling licences and well allowables which are processed on a day-to-day basis. Public hearings were held in connection with 76 of the applications, 28 of them by Board members and the balance by examiners selected from among the senior staff and appointed by the Board. Approximately 166 of the applications were considered after giving public notice for objections and the balance, having no impact on the rights of others, were dealt with directly by the Board and its staff.

Most of the Board departments are involved with the processing of applications from time to time. In fact, the functions related to applications form a large part of the work load of the Board organization. Many of the applications require extensive technical analysis and subsequent reports to the Board. The review of the performance of approved schemes also demands considerable attention from the technical departments.

In addition to the foregoing, there are other general activities in which the Board and its staff participated. One of these is contributing to the work of technical and other specialist committees of various government and industry organizations. Among the organizations having Board representation in 1969 were the Alberta Advisory Committee on Pollution Control, the Provincial Mines Ministers' Conference, including the Interprovincial Petroleum and Natural Gas Committee and its study groups, the Interstate Oil Compact Commission committees, the Alberta Petroleum Industry Training Service, the Petroleum Technology Committee and the Computer Technology Committee of the Southern Alberta Institute of Technology, the Gas Technology Committee of the Northern Alberta Institute of Technology, the NATO Wartime Oil Organization, the War Supplies Agency of the Department of Defence Production, the Emergency Measures Organization and the National Advisory Committee on Petroleum Statistics.

The Board continued a comprehensive training program for a Petroleum Technologist of the Government of Nigeria. Also, a three week program in administration of technical groups was provided for the Chief Engineer, Oil and Gas Conservation Department, Republic of Colombia.

A DEVELOPMENT DEPARTMENT

The Development Department is responsible for matters within the Board's jurisdiction concerning the drilling, completing and producing of wells.

The Department is divided into two main sections: the Drilling & Production Division under the Assistant Manager - Drilling & Production, and the Area Offices and Chemical Laboratory supervised by the Assistant Manager, Field Operations. The responsibilities, functions and organization of the divisions are described in more detail below.

(a) Drilling & Production Division

This Division's responsibilities are to ensure the proper location of wells and, by specifying requirements for the casing, cementing and abandoning of wells, reduce the possibility of subsurface contamination and blow-outs. For producing wells the Division requires proper measurement of produced and injected fluids, both on a pool-wide and individual basis. The Division is also responsible for such matters related to production as reduction of physical waste and control of air, water and soil pollution, approval of new types of production equipment, disposal of produced water, approval and surveillance of multizone completions, and control of common flow lines.

The major functions of the Division are

(1) to process applications to drill, suspend, rework, plug back or abandon a well; to specify casing, cementing and completion

practices; to calculate from directional surveys penalty factors for off-target wells;

(2) to appraise and make recommendations to the Board regarding the disposition of applications for special drilling spacing units and compulsory pooling to form drilling spacing units;

(3) to maintain files and records respecting well names and changes thereto, unit agreement areas, well licences, well licence transfers, amendments and cancellations, and appointment of agents;

(4) to review drilling and service rig inspection reports from the Board field staff, and correspond with contractors regarding the recommendations arising from the rig inspections;

(5) to co-ordinate field staff inspections of measurement practices, well testing procedure and production recording, and to correspond with the operators regarding the results of these inspections; to perform periodic audits of company production accounting methods at their central offices;

(6) to deal with requests for exemption from gas or water measurement of wells or pools and requests for reduction of well testing frequency;

(7) to appraise applications for water disposal schemes and recommend disposition of them, to review disposal methods for produced water and recommend volume restrictions for surface disposal where necessary;

(8) to review field reports regarding air, water and soil pollution and require operators to take the necessary steps to curb air pollution from well production facilities; and

(9) to process applications for multizone completions and common flow lines and schedule and evaluate segregation tests on multiple completions.

The Drilling & Production Division became an entity in 1969 by the amalgamation of two separate divisions. The staff consists of the Assistant Manager, a Senior Drilling & Production Engineer, two staff Engineers, five Technicians, a Clerk and four Stenographers.

Activities During the Year

Pollution control continued to occupy a significant portion of the Drilling & Production Division's efforts. A complete survey of batteries handling sour oil was carried out in the field to determine the effect of burning sour gas at these batteries. As a result of the study, the required minimum height of flare stacks was increased at all batteries to a minimum of 40 feet and to heights of 60 to 100 feet at several batteries where larger volumes of sour gas are burned. The study recommended gas gathering in the Clive-Alix area to reduce the number of odor complaints and the gathering system was in operation by September.

Special regulations were written to protect water fowl in the Zama Lake area. This shallow lake is one of the most important water fowl staging areas in North America and a number of small oil pools have been developed in and near the lake. The regulations specify precautions for drilling and producing operations to reduce the possibility of oil or drilling mud pollution of the lake and to reduce harassment of the birds during their stay on the lake.

The depth of surface casing and abandonment plugs required to protect fresh water supplies in the Province was determined by a study of current and potential fresh water aquifers. The Board's policy regarding specification of surface casing and abandonment plug depth was amended to provide protection of almost all known supplies of fresh water.

Four inquiries and one prosecution were undertaken during the year as a result of a variety of contraventions of Board orders or regulations. These included production in excess of the MRL, failure to submit GOR tests, emission of unburned sour gas, failure to run casing in a coal area well in accordance with regulations, and falsification of production records. In all cases, operations were revised by the owner to ensure that the contraventions did not recur.

(b) Area Offices

The chief duties of the area offices are to ensure that The Oil and Gas Conservation Act, 1969, the regulations thereunder, and the various other requirements of the Board are observed by the industry at the field level. Area office personnel gather drilling and work-over data, check subsurface pressure data using Board equipment, and procure fluid samples for analysis by the Chemical Laboratory.

To carry out these responsibilities, there are a number of separate duties which together comprise most of the work load of the area offices.

The major duties are

(1) to advise operators on the requirements of the Act, Regulations and Board policy regarding field operations;

(2) to issue or approve abandonment and casing programs;

(3) to check wells, batteries, measurement equipment and drilling and service rigs for compliance with the Regulations; to witness dual completion operations, segregation tests, back pressure tests and casing and abandonment operations;

(4) to carry out subsurface pressure measurements, calibrate pressure instruments and gather representative samples of oil, gas and water for analysis;

(5) to check operators' production practices and reporting procedures and make reports on gas processing plants, salt water disposal systems, pressure maintenance projects and gas conservation schemes;

(6) to investigate complaints regarding pollution of air, soil or water and take the necessary steps to stop the pollution; and

(7) to prepare weekly drilling progress and rework reports.

Organization and Staff

Five Area Offices at Edmonton, Drayton Valley, Red Deer, Medicine Hat and Black Diamond are supervised by Area Engineers or Area Supervisors who report to the Assistant Manager, Field Operations in Calgary.

At the end of 1969, the total field staff complement consisted of two Engineers, 33 Technicians, 7 Clerks and six Stenographers.

Activities During the Year

No major oil or gas fields appear to have been discovered during 1969, although drilling activity remained at the same general level as in previous years. Activity was greatest in the Zama-Virgo, Kaybob South, Ricinus, Provost and Alderson fields, where development drilling continued.

The number of rig inspections was higher in 1969, and unsatisfactory operations were more prevalent than in previous years. This was due in part to the Board's tightened requirements, which included extra equipment to detect increases or decreases in mud tank levels which indicate incipient blow-outs, and particularly the requirement that drilling crews become familiar with the blow-out control drill. Lack of trained rig personnel appears to be a major reason for unfamiliarity with the blow-out control drill.

Detailed analyses were made of the operations of a number of gas processing plants, which revealed a general lack of proper measurement and reporting of well and plant products. Further detailed inspections of gas plants are scheduled for next year.

To ensure that subsurface pollution of fresh water aquifers is not occurring, the inspection of surface casing vents and production packer installations was emphasized. Many surface casing flows of water or gas were discovered in the Pembina and Medicine Hat fields and operators were directed to remedy these deficiencies.

Testing of the tubing-casing annulus in disposal and injection wells revealed a number of leaking production packers, for which repairs or re-installation were required.

Inspection and calibration of fluid meters was decreased this year to allow time for more complete auditing of measurement and reporting procedures at production batteries.

(c) Chemical Laboratory

The staff of the Chemical Laboratory, located in Edmonton, is responsible for the selection and analysis of samples of oil, gas and water which are representative of the fluid content of various designated pools in Alberta. In addition, it collects, assesses, classifies and files the results of gas and fluid analyses from well owners for samples from wells drilled outside of designated fields. From these data sources, representative analyses for most of the oil and gas productive zones of the Province are selected and published. The Laboratory also performs analytical investigations related to production, disposal, pollution or pressure maintenance problems encountered by the field staff. Certain facilities are made available to the University of Alberta, and the Chief Chemist provides a limited amount of assistance with research projects of both the University and the Research Council of Alberta.

The analytical and clerical work is performed by two Technicians and two Typists and is supervised by the Chief Chemist.

Activities During the Year

The number of analyses performed by the Laboratory increased by 20 per cent over 1968.

A procedure for cleaning up oil spills by the use of a foam plastic was developed and tested successfully in co-operation with the Fish and Wildlife Division of the Department of Lands and Forests.

A revised summary of the helium content of Alberta natural gases was prepared.

A composite index was prepared for the Board's publication Oil, Gas & Water Analyses. The need for such an index was indicated by the large number of subscribers to the publication who subsequently asked for analyses missing from their sets.

B OIL DEPARTMENT

Responsibilities and Functions

The Oil Department is concerned with matters affecting conservation and correlative rights in crude oil production operations. It is responsible for the assessment and surveillance of enhanced recovery operations, assessment of reserves and productive capacity of oil pools, oil well spacing, oil sands schemes, experimental schemes, and technical matters relating to the proration plan.

The principal functions of the Oil Department relate to reservoir engineering and are

(1) to determine initial and remaining oil reserves, reserves growth trends and maximum rate limitations of production;

(2) to review the performance of all oil pools and enhanced recovery schemes therein, and recommend to the Board means of improving conservation in pools where it is feasible;

(3) to assess applications for enhanced recovery schemes, pilot tests and commercial and experimental oil sand schemes, and assess in co-operation with other departments applications concerning water disposal, concurrent production and production measurement;

(4) to assess applications respecting oil well drilling spacing units, production spacing units, blocks and projects and related matters;

(5) to co-ordinate measurements and maintain records of subsurface pressure surveys of oil pools in the Province; and

(6) to initiate Board orders for fields and pools; to establish minimum allowance allocations of production spacing units, blocks and projects; to advise the Board respecting ultimate

reserves, recovery factor modifiers, and maximum rate limitations and to advise the Economics Department in the preparation of the monthly crude oil production allowable order.

Organization and Staff

The Oil Department staff includes 16 Engineers, 19 Technical-clerical Assistants, two Stenographers and one Typist. The engineering staff is divided into two main divisions. The Reserves Division is responsible for evaluation of oil reserves, recovery factor modifiers and maximum rate limitations and for assessment of applications respecting oil well drilling spacing units, production spacing units, blocks and projects. The Projects Division is responsible for evaluation of proposed enhanced recovery schemes, surveillance of enhanced recovery operations in conventional crude oil pools, oil sands recovery schemes and experimental schemes. The clerical-technical group provides assistance to each engineering division, prepares basic technical data and performs routine Board administrative duties.

Activities During the Year

(a) Reserves Section

The year 1969 was a year of consolidation respecting development of crude oil reserves with net growth of 63 million barrels, a considerable drop from recent years. Major additions from individual pools included 111 million barrels at Nipisi and 28 million barrels at Willesden Green, chiefly attributable to recognition of water flood reserves. Re-evaluation of the Bellshill Lake Blairmore Pool resulted in additions of 25 million barrels. The Rainbow-Zama area accounted for 120 new pools and about 40 per cent of the oil wells completed in the Province during 1969. While reserves initially assigned to Rainbow-Zama during 1969 totalled 250 million barrels, the reserves eventually attributed to these pools may be considerably less based on past experience in these areas. Discoveries at Senex Creek, Ricinus and between Mitsue and Nipisi, although interesting, did not in themselves appear to be major discoveries.

In spite of the decline in reserves growth, the work of the reserves section reached probably its highest point in recent years owing to the need for suitable individual reserves evaluation for each of the very large number of pools in the Rainbow and Zama areas in addition to pools elsewhere in the Province. Preparatory to the application to each pool of material balances (both single cell and layered type) and one dimensional reservoir simulators, reservoir fluid and rock property plus reservoir pressure and production history must be compiled and proofed by the evaluating engineer. A measure of the work load of these types of studies is given by the fact that nearly 300 individual pool evaluations were performed using these investigation methods, with each evaluation involving from one-half day to three days of time by the engineer performing the study.

Production of pentanes plus from gas plants and synthetic crude oil from oil sands, both of which affect the market available for allocation to light and medium crude oil pools, will increase substantially if schemes approved in 1969 are fully implemented. Pentanes plus production from Kaybob South Beaverhill Lake gas processing plants is expected to reach 59 thousand barrels per day by 1972, while synthetic crude oil production from the proposed Syncrude plant is scheduled to produce 80 thousand barrels per day of product commencing in 1976. For comparison, during 1969 pentanes plus production averaged 102 thousand barrels per day (including ten thousand barrels per day from Kaybob South) and synthetic crude oil production 27 thousand barrels per day (from the Great Canadian Oil Sands plant).

(2) Projects Section

About 40 applications for new enhanced recovery schemes were processed in the Oil Department during 1969. Of these the most significant single enhanced recovery scheme was that of solvent flooding the Wizard Lake D-3 A Pool in which it is expected that crude oil recovery will be increased a further 69 million barrels. Considerable effort was spent in defining the basic rock and fluid properties throughout the pool in connection with solvent bank design specifications. Procedures and criteria in solvent bank design previously established in connection with the integrated scheme solvent floods in the Rainbow area, as well as the coning studies initiated in those schemes, served as a basis for investigating the efficiency of solvent bank flooding of the Wizard Lake D-3 A Pool. The owner plans to use a solvent bank relatively rich in intermediates, 73 per cent ethane plus, when compared to other miscible flood schemes in the Province. Total bank size will be about 26 million reservoir barrels or 5.35 per cent of hydrocarbon pore volume.

The Projects Section initiated requests for studies by the owners of enhanced recovery in approximately 20 crude oil pools exclusive of Rainbow-Zama of which the most noteworthy included Joffre D-2, Clive D-2, Clive D-3, Pembina Keystone Belly River B and about a dozen pools in the series of Lower Mannville and Mississippian age pools located in the Medicine River and Sylvan Lake fields. In about two-thirds of the pools, water flood schemes will be implemented with an aggregate gain in ultimate reserves of 52 million barrels.

Describing the rock properties and the macroscopic geometry of pools in the Rainbow and Zama areas continued to pose major problems during 1969. Through the use of the material balance combined with increased use of seismic data, interpretation of pool size has been substantially refined since initial developments in the Rainbow area. In the Zama area, however, pool geometry tends to be quite complex with the reef shapes taking on a mushroom-like configuration. Much time has been devoted to these interpretations because they have a bearing on the subsequent interpretations of the efficiency of the natural recovery mechanisms and the suitability of various enhanced recovery processes that might be applied to the pools.

Since pressure decline has been very marked in about three-quarters of the crude oil pools in the Rainbow and Zama areas, it might have been expected that enhanced recovery operations would have been necessary in most pools at this time. However, a staff review of nearly 300 of the pools indicated only a few cases of increasing gas-oil ratios, thus confirming that segregation drive is dominant in these high relief pools. It therefore appears more prudent to better define the nature and sizes of the pools via observation of pressures and production, and in view of the somewhat limited injection fluid supply and the relatively high cost of development and operations in the area, to work toward co-ordinated enhanced recovery schemes involving large numbers of pools.

Investigations of enhanced recovery in the Bantry Mannville Pool lead to the conclusion that water flooding would only be beneficial in isolated low pressure areas. Subsequently, an application was approved to water flood about 2½ sections or 15 per cent of the pool. There was very limited new activity respecting enhanced recovery in other heavy gravity crude oil pools. This tends to confirm that the problems of viscous fingering and coning continue to be the major obstacles to significantly improving recovery from heavy gravity pools.

Experimental operations in the oil sands deposits showed a marked decline in late 1969, probably as a reflection of the substantial commitments of many companies in the current developments in Alaska and the Canadian Arctic plus the stepped up interest in the foothills.

Other Developments

The Ante Creek condensing gas drive miscible flood, a high pressure flood involving injection of alternate slugs of water and enriched gas on about a three-month cycle, experienced serious scheduling problems during the year. In addition, experience showed a low transmissibility area which required conversion of an additional injection well in order to ensure that the pressure be maintained above the level of 3900 pounds per square inch gauge necessary for sustained miscibility. Similarly, the integrated scheme operated by Imperial Oil in the Rainbow South Field obtained an insufficient solvent injection supply from the fuel plant used for that purpose. For this reason, the scheme was operating at only approximately one-half design capacity after six months of operation and the company was making further plant modifications to provide the necessary solvent generation capacity.

Injection operations conducted in the Medicine River Jurassic C Pool indicated serious pressure drawdowns at wells more than a mile away from the downdip injection wells. As a result the operating company launched a full scale geological and engineering review to develop a three dimensional mathematical model of the reservoir. When developed, the model would be used to re-interpret performance and assist in modifying the injection pattern design to ensure adequate pressure response throughout the scheme area. In the meantime, the scheme was modified by removal of non-responding tracts and subjecting them to much reduced production withdrawal.

Studies of well bore transient flow phenomena including the occurrence and degree of water and gas coning received much increased attention during 1969. A special group of Board staff devoted its main effort to becoming fully familiar with transient flow theory and the obtaining of pressure measurements suitable for transient flow studies. Meanwhile some attention was devoted to the subject of well coning, both from the theoretical viewpoint using reservoir simulation methods and established flow concepts and also to application of empirical techniques. In this area very much more remains to be done.

An increased stress was placed on surface facilities such as water injection plants and gas processing and field gathering systems during the high demand period of late 1969. In addition, applications to infill drill in a few schemes in the Pembina Field are probably forerunners of future developments in that and other major fields in the Province. Increasing attention to these matters plus the problem of well coning will be needed in the coming year.

In the area of continuing technical proficiency the Oil Department technical staff participated in a major way in the development and presentation of in-house courses in reservoir engineering. A basic course was provided for junior engineers and technicians, and a more advanced course for senior engineers. Attendance of a few specially selected individuals at special conferences and courses such as those in connection with reservoir simulation and well coning theory were continued. The overall effort was slightly short of the target of 10 per cent commitment to the technical proficiency program.

C GAS DEPARTMENT

Responsibilities and Functions

The Gas Department is concerned with the conservation in Alberta of gas and related products, including propane, butanes, pentanes plus and sulphur. Also, the Department is responsible for the determination for the Province of the reserves and deliverability of gas, natural gas liquids and sulphur. It also assesses the availability of gas to meet the long term requirements of the various utility systems in the Province and the existing commitments for the removal of gas from the Province.

Specifically, the Department has the following functions:

(1) in the administration of The Oil and Gas Conservation Act, 1969

  (a) to determine reserves in all pools throughout the Province of gas, propane, butanes, pentanes plus and sulphur and the reserve growth trend for gas;

  (b) to establish permissible rates of production for gas wells, to determine frequency of gas well tests, and to prescribe methods of testing wells and calculating flow potentials;

(c) to make studies of the need for the installation of gas conservation schemes, and to review the performance of all established schemes;

(d) to assess the need for gas cycling schemes to conserve natural gas liquids, to review the performance of existing cycling schemes, and to assess the suitability of proposed schemes for the depletion of gas pools;

(e) to assess the suitability of proposed gas processing facilities, and to review the performance of installed gas processing facilities;

(f) to review regularly and at the request of the Public Utilities Board, the requirements for and availability of gas to small gas utility systems;

(g) to review, at the request of the Department of Mines and Minerals of the Provincial Government, applications to construct pipe lines and to advise the Department of the Board's findings; and

(h) to review the production performance of all gas pools and to recommend to the Board means of improving conservation where it is feasible;

(2) in the administration of The Gas Resources Preservation Act, 1956

(a) to determine the Province's reserves and the reserve growth trends for gas and for propane in order to assist the Board in assessing applications for their removal from the Province;

(b) to determine the deliverability of gas produced from fields connected, or expected to be connected, to intraprovincial markets and extraprovincial markets at such time that applications for removal of gas from the Province are considered by the Board; and

(c) to determine the availability of propane in the Province at such times as applications for removal of propane from the Province are considered by the Board.

Organization and Staff

The Department is primarily technical in nature and is headed by the Manager. The Assistant Manager is responsible for the day-to-day operations of the Department. The Reserves

Section is responsible for the evaluation of gas reserves and the establishment of permissive rates of production for gas wells. The Projects Section appraises proposals presented to the Board concerning the cycling of gas pools and the processing of raw gas to produce marketable gas, natural gas liquids and sulphur. It also estimates the reserves of propane, butanes, pentanes plus and sulphur, and is responsible for the surveillance of existing gas utility systems. The Conservation Section is responsible for the surveillance of existing gas processing plants and gas conservation operations in oil and gas fields, and for studies of the feasibility of conserving oil field gas. The total Department staff comprises six Engineers, six Technicians a Stenographer and three Clerks.

Activities During the Year

The Board heard publicly an application of the Alberta Division of the Canadian Petroleum Association requesting that the Board modify its present policies and procedures in determining the volume of gas reserves surplus to the needs of the Province. The hearing also dealt with certain procedural matters not included in the application but for which the Board requested representations. The application resulted in policy changes such that: the annual growth rate for gas reserves as used in determining the future surplus is now calculated on the basis of the average over the most recent 10-year period; the number of years of growth in reserves is determined on the basis of the Province's estimated remaining reserves potential; and a portion of currently deferred gas is now included in the calculation of contractable surplus rather than in the future surplus as was the practice. The additional procedural matters introduced by the Board resulted in the scheduling of triennial hearings to consider the gas requirements of the Province, and the simplification of the calculation of the gas necessary to meet the Province's total requirements. It was also decided to not hold an annual hearing to consider the gas reserves of the Province.

The Department was involved in the consideration of five applications made under The Gas Resources Preservation Act, 1956 for the removal of a total of some 6.5 trillion cubic feet of gas and some 40 million barrels of propane from the Province. Three of the applications requested amendments to existing permits increasing the volumes authorized for removal. One of these applications, for 2.2 trillion cubic feet of gas, was granted in full. A second application for 1.7 trillion cubic feet was granted but for a reduced volume of 1.2 trillion cubic feet, and a third application for 0.3 trillion cubic feet had a decision pending at year end. A fourth application was for a new permit authorizing the removal of 2.3 trillion cubic feet of gas from the Province. The permit was granted but for a volume reduced to 1.5 trillion cubic feet. The fifth application requested authorization to remove propane from the Province and was granted for essentially the requested volume of some 40 million barrels. In total, an additional 4.9 trillion cubic feet of gas and 40 million barrels of propane was authorized for removal from the Province during the year. In assessing these applications and in determining year-end reserves, estimates of gas, natural gas liquids and sulphur reserves of some 350 pools were considered in varying degrees of detail.

A great deal of work was again devoted to the determination of the gas reserves of certain pools where considerable production has occurred, on the basis of the pressure performance in relation to the total fluid withdrawals. In the assessment of applications for removal of gas and propane from the Province, consideration was given to the deliverability of pools supplying gas to local utilities and included in permits, and to the long term availability of propane.

A scheme for reprocessing a portion of the gas removed from the Province through the Plains Division of the Alberta Gas Trunk Line system was considered and an approval was granted. The reprocessing plant will be located at Empress. The scheme is similar to one in existence, which is also located at Empress, and which processes the current throughput of the Plains Division of the Alberta Gas Trunk Line system. A similar operation has been approved for the Foothills Division of the Alberta Gas Trunk Line system with the reprocessing plant to be located at Cochrane. The recently approved scheme is for the processing of some 1,000 million cubic feet of gas per day. Some 7,000 barrels of propane, 3,000 barrels of butanes and over 800 barrels of pentanes plus will be extracted daily.

Studies were made of the feasibility of conserving gas produced in fourteen oil fields. The need for gas conservation was considered at public hearings for three oil fields. Three gas conservation orders were issued as a result of these hearings and another three were issued as a result of public hearings held in the latter part of 1968. In several other instances, Board staff studies and subsequent discussions with the operators and well owners resulted in plans for the installation of additional gas conservation facilities. Numerous requests were handled for exemption from the provisions of existing gas conservation orders.

During the year, the Department considered eight applications for the cycling of gas in pools rich in natural gas liquids. Six of the applications were for amendments to existing schemes and two sought approval of new schemes. The Kaybob South Beaverhill A Pool was the subject of an application for approval of a cycling scheme to improve recovery of the natural gas liquids. The application was a follow up to an earlier application which was dismissed by the Board. It was for a scheme to produce 615 million cubic feet per day of raw gas from the reservoir and process the gas to yield 395 million cubic feet per day of residue gas, of which 100 million cubic feet per day would be sold and the rest returned to the formation, 10,700 barrels per day of propane, 10,800 barrels per day of butanes, 46,900 barrels per day of pentanes plus, and some 3,700 long tons per day of sulphur.

The Board approved the application subject to a reduction in the sales gas rate to 75 million cubic feet per day.

Applications were received for 17 new gas processing schemes and modifications to six existing schemes. In considering gas processing plant applications, particular attention was given to the economic feasibility of conserving vapours from processing vessels and stock tanks as well as the feasibility of improving sulphur recovery. The Department completed a study of the feasibility of manufacturing sulphuric acid from the sour tail gases at processing plants.

The Department processed five applications for approval of the underground storage of gas and natural gas liquids. Most of the applications related to the temporary storage of oil field solution gas which could not be accommodated at existing processing facilities during a period of high oil allowables.

Applications for approval to commingle production from several pools were considered. Also, studies were made respecting the permissive gas production rates consistent with maximum ultimate recovery for some twenty-five pools. Seventeen of the pools were considered at a public hearing and orders regulating maximum producing rates were issued for eleven pools.

The staff co-operated with representatives of the Development, Oil and Data Processing Departments on numerous additional applications and special studies. Types of applications which this Department was consulted on included those for concurrent production of gas and oil, gas-oil ratio penalty relief, solvent and gas flooding, suspension of well spacing regulations in gas fields, special gas well spacing units and relief from normal gas measurement requirements. Major special studies to which the Department contributed included the mathematical simulation of reservoirs and transient flow phenomena in reservoirs.

D GEOLOGY DEPARTMENT

Responsibilities and Functions

The Geology Department is responsible for the preservation and evaluation of certain well data, the administration of the Board's well evaluation requirements, the mapping of oil and gas reservoirs and the preparation of subsurface geological maps. Upon request, the Department undertakes special studies to assist other Board departments and the Alberta Department of Mines and Minerals. The Department also directs the operations of the Board's Core Storage Center and the Drafting Section.

The main functions of the Department are

(1) to administer the coring, logging, drill stem testing and drill cutting requirements of the Board and to collect and store logs and drill stem test charts;

(2) to receive, process and provide examination facilities for drill cuttings and core at the Core Storage Center;

(3) to evaluate hydrocarbon-bearing intervals at all productive wells and prepare maps

to delineate the area and volume of each pool;

(4) to identify, record and publish the names and depths of the stratigraphic markers penetrated by all wells drilled;

(5) to investigate and report on the geological aspects of submissions or other evidence filed with the Board;

(6) to advise the Board, other Board departments and the Department of Mines and Minerals on geological matters;

(7) to assist the Development Department in ensuring that a well drilled to supply an oil field water injection scheme does not interfere with domestic water supplies;

(8) to develop and maintain geological cross sections, and well location and well status maps for sale and on-premise use;

(9) to classify each well licensed in accordance with the Lahee classification system; and

(10) to provide all drafting services necessary for the Board's functions.

Organization and Staff

The Manager of Geology is both head of the Geology Department and Chief Geologist of the Alberta Department of Mines and Minerals. Within the Geology Department there are three sections. The Geology Section comprises the Manager, the Assistant Manager, ten Geologists, four Technicians, one Stenographer, three full-time Clerks and one part-time Clerk. The Core Storage Center is located in a separate building. It is headed by a Supervisor responsible to the Manager of Geology and is staffed by 16 employees. The Drafting Section consists of five Draftsmen, including the Senior Draftsman who reports to the Manager of Geology.

Activities During the Year

(a) Geology Section

During the year, stratigraphic markers were identified and published for 1,900 wells and hydrocarbon-bearing zones were evaluated for some 800 wells.

A considerable amount of time was spent investigating applications and submissions received from operators on such matters as production spacing units, pressure maintenance schemes, and special target areas and spacing units.

Miscellaneous activities included classifying wells, determining casing requirements, collecting stabilized pumping levels on water supply wells, investigating near-surface blowouts in areas where test hole applications were received, and appraising logging and coring programs and abandonment applications.

A considerable amount of time was spent preparing data used in regional mapping for magnetic tape storage. On some projects, results from computer plotting and contouring were successful and the Department anticipates additional applications in this field.

Geological work for the Department of Mines and Minerals consisted of evaluating parcels for Crown reserve sales, processing P. & N. G. reservation reports for lease rental credit, preparing zone designations and providing technical advice on applications for gas leases.

(b) Core Storage Center

Public examination of core and drill cuttings continued at a high level. An average of about 27 geologists used the facilities each working day. A total of 100,000 boxes of core and 520,000 drill cutting samples were examined during the year.

Some 351,000 sets of drill cuttings were sorted, washed and stored, this quantity being a record for any one year period. In addition, 16,000 boxes of core were received into storage. To provide space for the incoming core, 16,000 boxes of backlog core were re-packaged in the smaller cartons currently in use.

Minor modifications were made to the ventilation system of the Center to reduce the noise level and further improve control of dust and acid fumes.

(c) Drafting Section

During the past year, over 100 maps were up-dated on either a weekly or monthly basis and a number of new maps were drafted. A significant portion of the time was spent preparing oil and gas pool performance charts, gas plant performance charts and various forms for the Data Processing Department.

E DATA PROCESSING DEPARTMENT

Responsibilities and Functions

The Data Processing Department is responsible for carrying out systems planning, program development, computer operations, staff training related to data processing, and for reviewing data processing advances and new equipment development.

More specifically the functions of the Department are

(1) to analyze existing and proposed manual and computer systems with a view to designing and implementing new systems, improvements and innovations;

(2) to write engineering, accounting, statistical and economics related computer programs as required in the work of the Board organization;

(3) to accurately process data received from other departments in order to obtain statistics for internal use or for publication;

(4) to perform computer calculations for geological and for oil and gas engineering evaluations;

(5) to carry out effective closed-shop programming by educating department staff and by maintaining an appropriate literature and program library;

(6) to encourage open-shop programming by educating staff from other departments and by assisting with open-shop programming assignments where necessary;

(7) to advise the Board on advances in the field

of computer technology; and

(8) to familiarize supervisors and personnel throughout the organization with computer applications, data processing and effective systems planning.

Organization and Staff

The Data Processing Department is divided under the Manager into two main divisions with two Supervisors, one of Programming and one of Operations. There is also a Systems Analyst who reports directly to the Manager. The remainder of the staff comprises eight Programmers, six Computer or Keypunch Operators and a Stenographer.

The Programming Division is responsible for all computer systems and programs required by other departments in the Board organization, while the Operations Division is responsible for all functions related to machine processing. The Systems Analyst works closely with other departments and the Programming Division in the development of new manual and computer systems.

Activities During the Year

During 1969 the Department undertook the review of established systems for the purpose of eliminating some of the more obvious inefficiencies. The resulting changes, together with regular program maintenance and systems expansion became a major work load.

For the Programming Division, 1969 was in many ways a year of consolidation of previous efforts. A large backlog of program documentation was completed early in the year. Program systems to maintain accumulated historical pool and well data were completed. Data editing and file cross-referencing were established for routine application.

Significant new application areas were for: a program system to prepare and print much of the tabulated data in the Board's annual reserves report; a file supported system for computer assisted reserve calculations; a series of programs to evaluate pressure build-up in oil and gas wells; a computer system to maintain current drilling data and prepare drilling reports for publication; and a proration forecasting procedure. Members of the Programming Division were also involved in a major effort to increase data exchange on computer media between the oil and gas industry and the Board. Other staff have shared in a major effort towards development of reservoir simulation programs.

During 1969, a computer time sharing terminal, which provides technical personnel with immediate access to a large off-premise computer, was introduced into the Board organization. Since it is essentially a user department tool, this Department has organized courses for potential users, provided programming assistance when necessary, and has generally supervised introduction of the terminal.

The Systems Analyst co-operated with members of other departments in a major review of the Board's Printing and Supplies Division. In addition, a review of and substantial revision in the use of dictaphone facilities throughout the Board organization was completed during 1969.

During the year the Operations Division was involved primarily with the encoding and processing of business and engineering data in accordance with regular schedules. Use of the Board's computer installation has continued at approximately two shifts per day. Major fluctuations in the work load have been eliminated by improved scheduling. Approximately one quarter of the computer time has been used for program development and the remainder for a variety of production runs. Some 12,000 individual jobs were processed through the computer system during 1969.

F ECONOMICS DEPARTMENT

Responsibilities and Functions

The Economics Department is responsible for economic analysis and evaluation, the compilation of statistics and forecasts and the preparation of the monthly proration order.

The main functions of the Economics Department are

(1) in co-operation with the Oil and Gas Departments, to forecast demand and supply for liquid hydrocarbons, sulphur and natural gas in the Province of Alberta;

(2) to prepare a five-year forecast of petroleum industry activity relative to the functions of the Board to serve as a basis for the Board's annual five-year expenditure and

revenue forecast;

(3) to carry out special studies relating to economic aspects of conservation and applications presented to the Board;

(4) in co-operation with the Oil Department, to carry out the monthly oil proration computations;

(5) to assess the competitive position of Alberta crude oil in existing and potential market areas; and

(6) to compile statistical and other information covering all aspects of the oil and gas industry.

Organization and Staff

The staff complement at December 31, 1969, comprised the Department Manager, two Economists, an Economics Assistant, a Statistical Clerk and a Stenographer.

Activities During the Year

The Department participated in projects related to several major Board hearings. These included: (i) an application by Trans-Canada Pipe Lines Limited for an amended permit authorizing the removal of an additional 2.2 trillion cubic feet of gas from the Province; (ii) a review of policies and procedures for considering applications under The Gas Resources Preservation Act, 1956; (iii) the amended application of Atlantic Richfield Company, Cities Service Athabasca, Inc., Imperial Oil Limited and Royalite Oil Company, Limited to produce some 80,000 barrels per day of liquid hydrocarbons from the Athabasca oil sands; and (iv) an application by Dome Petroleum Limited and Trans-Canada Grid of Alberta, Ltd. for removal of propane from the Province.

During the year, the Department carried out a number of special studies, including a comprehensive review of the relationship between the demand for Alberta crude oil and the Province's effective capacity. The Department provided assistance to the Data Processing Department at various stages in the preparation of a proration forecasting program. Towards the end of the year, the Department, in conjunction with the Data Processing and Accounting Departments, commenced work on revisions to the Board's underproduction regulations.

A continuing objective of the Department is the performance of research related to various aspects of the oil and gas industry. In this connection, the Department has assessed the application of certain probability distributions to the size of oil and gas reservoirs. The Department also reviewed methods for determining the supply price of Alberta conventional crude oil. The population model developed by the Department was modified and extended, primarily for use in regional population forecasting.

G ACCOUNTING DEPARTMENT

The Accounting Department's responsibilities are carried out under two separate divisions: Financial Accounting and

Production Accounting. The Manager of Accounting is the head of the Department and reports to the Board.

(a) Financial Accounting Division

Responsibilities and Functions

The Financial Accounting Division is responsible for all general accounting and budget preparation. It assists in the collection of the Board's annual tax levy and provides the Board with all information for budget control.

The major functions of the Division are

(1) to process all expenditures, receive all revenues and maintain all necessary records;

(2) to close the accounting records as at March 31 each year and co-operate with a representative of the Provincial Auditor in his annual audit;

(3) to prepare, in co-operation with the other departments, the budget for Board approval for the next fiscal year and prepare a five-year forecast of expenditure and revenue;

(4) to provide the Board with monthly comparisons of budgeted and actual expenditure and revenue, to assist in the maintenance of control over expenditure, and to advise the Board on current financial policy;

(5) to assist, in co-operation with the Assistant Assessor, in the collection and follow-up of outstanding tax accounts;

(6) to maintain records necessary for the control of all inventorial assets of the Board and to supervise the annual physical check of inventory items.

Organization and Staff

The Financial Accountant is the head of the Division and is responsible to the Manager of Accounting. The staff complement at December 31, 1969, was the Financial Accountant, four Accounting Clerks, one Typist and a Bookkeping Machine Operator.

Activities During the Year

During 1969, the general accounting functions embracing revenues, expenditures and budget were of a routine nature.

(b) Production Accounting Division

Responsibilities and Functions

The Production Accounting Division is responsible for the receipt and processing of oil and gas production and dispositio reports, and the preparation of detailed and summary information on oil and gas for use by the Board, industry and other agencies. The Assessment Section is a part of the Production Accounting Division.

The major functions of the Division are

(1) to collect from industry the well production data and well and plant disposition data required under The Oil and Gas Conservation Act, 1969;

(2) to ensure that the reporting forms in use

provide for the efficient collection of required information and are revised to meet changing needs; and to co-operate with other Provincial and Federal agencies in the use of comparable forms, and in the avoidance of duplicate collections of original data, where possible;

(3) to examine the oil and gas production and disposition reports received to ensure that regulatory requirements are met by the operators and, with the assistance of the Data Processing Department to prepare detailed and summary records;

(4) to check the reported oil, gas and water production against assigned allowables and notify operators of the over or under status for each of their wells;

(5) to maintain records of production spacing units, blocks, projects, and single wells in connection with the proration plan, showing minimum allowances and assigned acreages, and to make such records available to the Economics Department for the preparation of the monthly proration order;

(6) to ensure that monthly and annual statistical reports and well and pool production

publications are issued as accurately and timely as possible; and

(7) to prepare the assessment roll, to issue assessment notices, process appeals, issue tax notices and assist in the collection of the tax levy.

Organization and Staff

The Production Accountant and Assessor is the head of the Division and is responsible to the Manager of Accounting. He is assisted by the Assistant Assessor, the Statistics and Publications Supervisor, the Production Records Supervisor, 18 Clerks, a Typist and a Stenographer.

Activities During the Year

The year 1969 was a particularly busy one for the Production Accounting Department. In the Report Processing Section considerable progress was made in the development of computer and manual surveillance techniques for both production and disposition reports, in the areas of water and gas credits, testing frequencies and coding. Arrangements were made with the Development Department in regard to the approval of gas proration batteries, which are becoming more numerous as gas production increases. During the year, several more operators commenced submitting production data on either machine card or magnetic tape, so that a substantial proportion of production data is now received in this manner for direct processing. Problems relating to the surveillance of this data, largely duplication, and errors arising from amendment procedures, are being solved with participants' co-operation as they are recognized. Discussions were held with industry on the subject of reporting disposition data on magnetic tape, and a pilot run is expected shortly.

The Allowables Section made the necessary transition to the final phase of the New Proration Plan in May, 1969 , and few problems were encountered. Later in the year, in an effort to improve efficiency in the process of checking oil and gas production against production allowables, an experiment was carried out utilizing microfilm from magnetic tape and viewing screens, as an alternative to the printed form in regular use. The results indicated that in its present stage of development, the method was less efficient than the present system, and the experiment was discontinued. The section is in the pilot stage of a further computer application to allowable status checks. It is proposed to provide to a well owner a tape record of the Board's allowable calculations for his wells so that monthly comparisons can be made by computer, thus minimizing the visual and manual checks required at present. The Department expects that it may gain considerable acceptance of this method with the larger companies.

At year end the Production Section of the Department was in the process of establishing the historical well production file (prior to January 1, 1967) on magnetic tape. Currently, and as a result of the procedures followed in the system change in January, 1967, there is no computer access to well data prior to that time. It is expected that this major undertaking will be completed by mid-1970.

The Statistics Section has continued to improve the statistics relating to the disposition of propane, butane and sulphur. A monthly review prior to publication of propane and butane supply and disposition is now being held with members of the Propane Gas Association of Canada Statistical Subcommittee. The advice given at these informal meetings by the industry representatives has resulted in better L.P.G. statistics. In addition, the disposition of sulphur statistics was improved in 1969 with the introduction of a Post Plant Sulphur Statement.

Considerable attention was given to the redesign of several reporting forms, and particularly to those respecting gas gathering and plant operations, both of which will soon be available in a revised format. Of note also is the discontinuance of the Monthly Petroleum Products Purchasers Statement replaced by the reporting of details by letter, where necessary.

Substantial changes were made by the Assessment Section in 1969, and these changes will take effect in the 1970 tax year. Commencing in 1970, the Government of Alberta has decided to provide 50 per cent of the estimated net expenditure of the Board, replacing the former arrangement whereby it paid 40 per cent of the actual net expenditure plus the payment of the Board's tax on Crown-owned oil and gas properties.

The details of the method by which the change was accomplished was discussed with and approved by the Canadian Petroleum Association Taxation Committee. Other changes made this year include the discontinuance of the assessment of undrilled acreage, and the use of production rather than the rate of production in the assessment formula used to determine property valuation. In addition, the Board now sets out the assessment areas in map form only, and has discontinued its use of written descriptions of assessment areas.

H OFFICE SERVICES DEPARTMENT

Responsibilities and Functions

The Department is responsible for purchasing, printing and mailing, control of well records and central filing, building requirements and services, and switchboard and reception duties.

The major functions are as follows:

(1) to attend to space, service and insurance requirements of all Board buildings;

(2) to maintain a purchasing and stock control program;

(3) to observe and control motor vehicle operating costs;

(4) to print or arrange for commercial printing of letters, orders, forms, reports, publications, maps, amendments to Acts, regulations and the Index of Board Orders; to maintain address plates for subscription lists, mail

lists, and for various record-opening forms for new wells;

(5) to attend to all mailing functions and to operate all file systems other than department; to serve public requests for information from filed documents;

(6) to provide library services and transcriptions of public hearings; and

(7) to maintain drilling records for all wells drilled.

Organization and Staff

The Department is headed by the Manager who reports to the Board. There are three sections in the Department: Printing and Supplies, Records and Purchasing, each headed by a Supervisor. The staff complement includes 20 Clerks, six Machine Operators and six Receptionists, Switchboard Operators, Typists and Stenographers.

Activities During the Year

A systems study concerning the Reproduction Section was completed and some major changes were instituted. These changes related to space layout, new equipment and the method of co-ordinating Departmental printing requests. There has been an increase in the volume of printing output per employee, less overtime and improved liaison with Departments concerning their printing requirements. The section name was changed to Printing and Supplies.

Activities in Records and Purchasing were at normal levels.

I PERSONNEL DEPARTMENT

Responsibilities and Functions

The Personnel Department is responsible for attracting and retaining competent staff to conduct the Board's business, and also for ensuring that the Board's personnel policies and benefits are adequately and equitably administered.

The principal functions are

(1) to recruit new staff in co-operation with other departments;

(2) to administer programs of employee performance evaluation, continuing education and employee benefits;

(3) to administer the Board's salary policy and conduct annual salary surveys; and

(4) to prepare, with the assistance of the other departments, the annual salary budget for the next year and record variances during the current year.

Organization and Staff

The Department is headed by the Manager, who reports to the Board. He is assisted by two Personnel Assistants, one Clerk and one Stenographer.

Activities During the Year

The Department carried out its annual survey of the salaries paid by the petroleum industry and by the Provincial and Federal Governments to assist the Board in its annual salary review. Other surveys in which the Board participated were analyzed in order to ensure that the Board's salaries and other benefits were competitive. These surveys included such items as vacation entitlement and relocation expenses.

In the Spring of 1969, Personnel Department commenced a continuing series of Employee Induction Sessions wherein recently employed persons received orientation lectures from representatives of all sections of each Department.

Also in the Spring, a Supervisory Training Course was presented for appropriate employees, with regularly-scheduled follow-up sessions continuing throughout the year.

During the Fall of 1969, the Board's first official Personnel Policy Manual was completed and received preliminary distribution.

VI EXPENDITURE AND REVENUE

The Board's fiscal year end is March 31, but, since all other sections of this report relate to the calendar year, the Board has decided to ignore the three month difference and treat expected expenditures and revenues relating to the fiscal year April 1, 1969 to March 31, 1970, as applying to the 1969 calendar year. Financial data for previous fiscal years are applied to the calendar year in a similar manner.

Table 1 provides a summary and comparison of expenditures and revenues for the years 1965 to 1969 inclusive. The Board's net expenditure represents the sum of salary, general operating, and capital expenditures less collections from the sale of publications and information. The cost of capital acquisition is charged in full against revenue in the year of purchase. Revenue of the Board is received through the levy of a tax upon the assessed value of all oil and gas properties liable to assessment and by a grant from the Provincial Government.

During the last five years, che Board's net expenditure has increased at an average annual rate of 8.8 per cent. Net expenditure during 1969 was $2,665,000, an increase of $179,000, or 7.2 per cent over the previous year. Salary expenditures increased by $178,000 or by 8.5 per cent to $2,268,000 which was below the five year average of 9.4 per cent. Other general operating expenses increased by $63,000 or by 10.0 per cent to $693,000 while capital expenditure increased by $22,000 to $85,000. Collections increased by $84,000 to $381,000, due mainly to the sale of well data and core analysis files which became available on magnetic tape for the first time.

Table 2 gives a comparison of Board expenditures in terms of wells capable of production, industry production revenue, and equivalent barrels of production*. Industry production revenue represents the total sales value of crude oil, natural gas and products at the well or plant. In 1969 the value of crude oil sales represented 73 per cent of the total production revenue as compared to 70 per cent in 1968.

The cost per capable well of operating the Board increased from $136 in 1968 to $140 in 1969. A review of these costs over a longer period indicates that Board expenditure per capable well increased steadily until 1957, when it reached $136, and then declined to $115 in 1965. Recent significant increases in salary costs, and the reduced rate of increase in the number of capable wells, due to the introduction of a new proration plan in May, 1965, have reversed that trend. Board expenditure per equivalent barrel of production revenue decreased slightly to 0.59 cents in 1969. As in 1968, a modest increase to Board net expenditure was more than offset by substantial increases in the growth rate of industry revenue resulting in the reduction in unit cost.

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* Equivalent Barrels = total industry production revenue divided by weighted average price per barrel of oil.

For 1969, as in previous years, the Provincial Government will provide the funds necessary to meet approximately 47.8 per cent of the Board's net expenditure. This amounts to some $1,273,000 and represents a direct grant from the Provincial Government of $1,066,000 to meet 40 per cent of the net expenditure and an additional $207,000, being the Government's share of the Board's tax levy. The remainder of the tax levy charged to all other owners of oil and gas properties assessed amounted to $1,392,000 in 1969, an increase of $91,000 over the previous year.

The assessed value of oil and gas properties subject to assessment in 1969 was $2,375,000,000 resulting in a mill rate of 0.71 mills to raise the portion of Board revenue met by taxation.

TABLE 1

OIL AND GAS CONSERVATION BOARD
COMPARATIVE STATEMENT OF EXPENDITURE AND REVENUE
FOR THE FIVE YEARS 1965 - 1969

(000's Dollars)

	1965	1966	1967	1968	1969
Expenditure					
Salaries	$1,543	$1,778	$1,953	$2,090	$2,268
General Operating					
Building rent, utilities	182	186	193	217	218
Printing, office supplies	83	89	88	84	95
Travelling, automobile	61	67	64	68	75
Machine rental and repairs	59	79	119	125	141
Telephone	22	22	27	30	32
Lab. and Field supplies	20	16	22	20	32
Miscellaneous	69	75	75	86	100
	496	534	588	630	693
Capital	44	46	51	63	85
Total	$2,083	$2,358	$2,592	$2,783	$3,046
Collections	207	237	234	297	381
Net Expenditure	$1,876	$2,121	$2,358	$2,486	$2,665
Revenue					
Industry	$ 992	$1,114	$1,237	$1,301	$1,392
Province of Alberta	884	1,007	1,121	1,185	1,273
Total Revenue	$1,876	$2,121	$2,358	$2,486	$2,665
Percentage Increase in Net Expenditure over Previous Year	5.4	13.0	11.1	5.4	7.2

TABLE 2

OIL AND GAS CONSERVATION BOARD

Comparison of Board Net Expenditure

Per Capable Well and Industry Production Revenue

	Total Capable Wells	Staff Complement at December 31	Industry Production Value (000)	*Annual Production Equivalent Barrels (000)	No. of Capable Wells Per Staff Member	Board Net Expenditure	
						Per Capable Well (Dollars)	Per Equivalent Barrel (Cents)
1965	16,299	259	704,267	274,786	63	115	.68
1966	16,980	264	791,913	307,948	64	125	.69
1967	17,586	265	912,443	361,191	66	134	.66
1968	18,312	271	1,054,776	409,905	68	136	.61
1969	19,031	275	1,143,977	448,618	69	140	.59

$$\text{*Equivalent Barrels} = \frac{\text{Total industry production value}}{\text{Weighted average price per barrel of oil}}$$

VII PUBLICATIONS AND ADDRESSES

The Board makes available to industry and the general public a wide variety of publications and maps. The pricing policy is based on the principle that those costs associated with a publication which are over and above normal operating costs must be met by revenue generated from its sale.

In 1969 the following special reports resulted from major public hearings:

OGCB 69-A	Report on an Application of Alberta and Southern Gas Co. Ltd. under The Gas Resources Preservation Act, 1956.
OGCB 69-B	Report of an Application of Atlantic Richfield Company, Cities Service Athabasca, Inc., Imperial Oil Limited and Royalite Oil Company, Limited under Part IV A of The Oil and Gas Conservation Act.
OGCB 69-C	Report of an Application of Atlantic Richfield Company, Cities Service Athabasca, Inc., Imperial Oil Limited and Royalite Oil Company, Limited.
OGCB 69-D	Report and Decision on Review of Policies and Procedures for considering Applications under The Gas Resources Preservation Act, 1956.
OGCB 69-E	Report of an Application for a Permit Authorizing the Removal of Propane from the Province of Dome Petroleum Limited and Trans-Canada Grid of Alberta, Ltd. under The Gas Resources Preservation Act, 1956.
OGCB 69-F	Report of an Application of Trans-Canada Pipe Lines Limited under The Gas Resources Preservation Act, 1956.
OGCB 69-G	Report of an Application of Consolidated Natural Gas Limited under The Gas Resources Preservation Act, 1956.

New Publications or Services Made Available in 1969

Computer Services

During 1969 the Board made available for sale on magnetic tape its General Well Data files. The information was made available at one price for information to date and a further charge for an up-dating service.

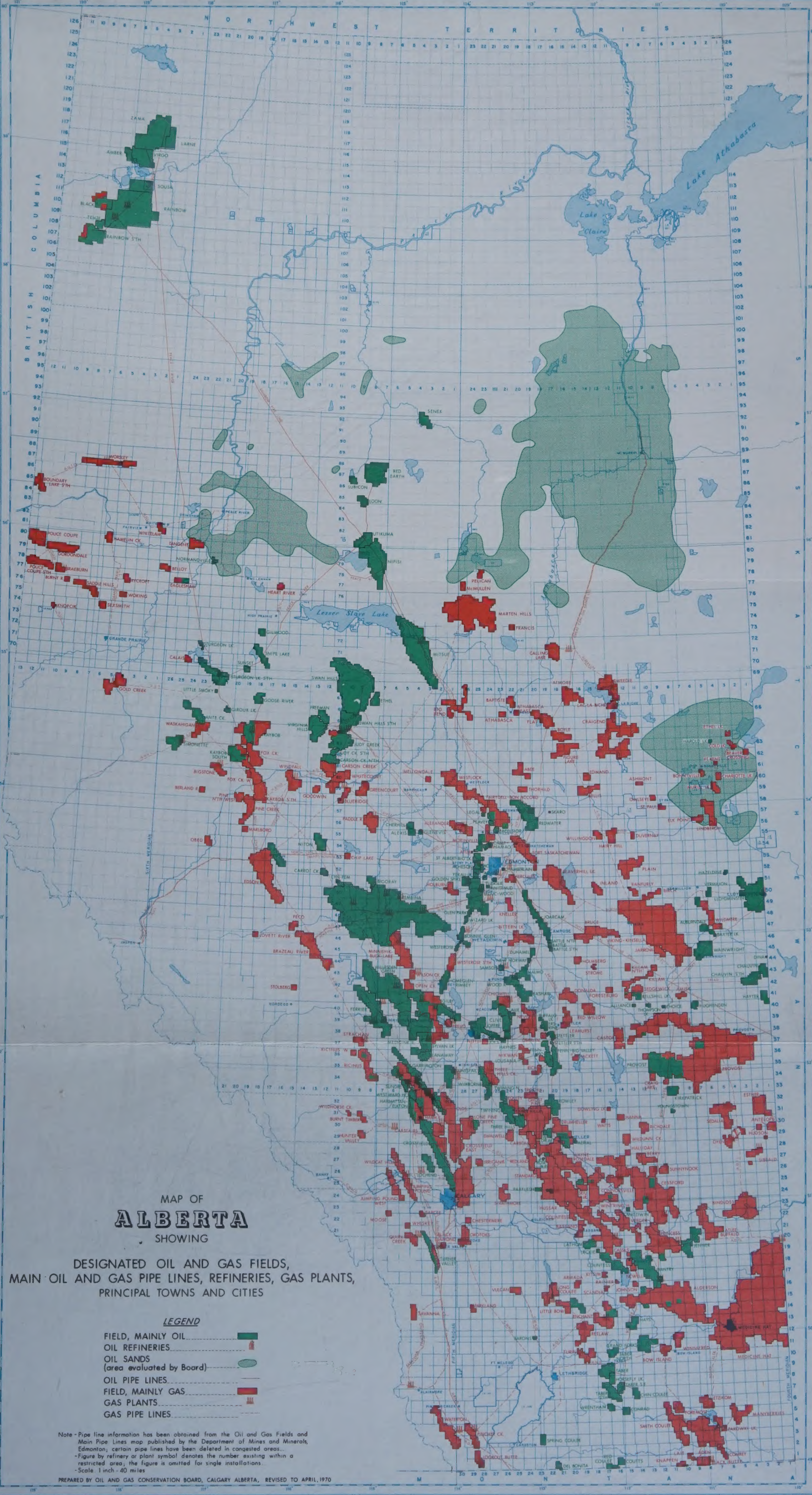
Addresses and Technical Papers

The following addresses, lectures or technical papers were presented by members of the Board and its staff in 1969:

Speaker	Title of Address
G. W. Govier	"Discussion of Government and Board Policy Re Athabasca Type Oil Sands" Seminar sponsored by Marathon Oils in Denver, Colorado, U.S.A. January 30, 1969
G. W. Govier	"Alberta's Sulphur Resources" Alberta Sulphur Research Symposium in Calgary February 6, 1969
G. W. Govier	"Opportunities of Communication" Fourth Year Engineering Class, The University of Alberta February 21, 1969
G. W. Govier	Talk to Graduating Engineering Class of The University of Calgary at APEA Luncheon, Calgary March 29, 1969
G. W. Govier	"Twenty Years of Progress" Twentieth Annual Technical Meeting of Petroleum Society of CIM, Edmonton May 7, 1969
G. W. Govier	"Alberta's Oil Sands Development Policy" Meeting of Canadian Society for Chemical Engineering, Edmonton October 20, 1969

Speaker	Title of Address
N. G. Berndtsson	"Use of Reserve Estimates and How They Are Obtained" SAIT Petroleum Technology Students May, 1969
M. Jamil	"Miscible Flooding" University of Calgary - Engineering 632 February, 1969
M. J. Stowko	"Production Spacing Units, Blocks and Projects" SAIT Petroleum Technology Students May, 1969
N. A. Strom	"Oil Proration to Market Demand" PITS Unitization School, Banff November, 1969
G. C. Watkins	"Factors Affecting Markets for Western Canadian Oil" Petroleum Accountants Society of Western Canada, Calgary April 23, 1969
G. C. Watkins	"Patterns of Energy Use and Factors Affecting Markets for Canadian Petroleum" Alberta Society of Petroleum Geologists, Calgary May 21, 1969
J. R. Pow	"Core Storage in Western Canada" A.S.P.G. Calgary Core Conference September 5, 1969
P. D. Larbalestier	"Rig Inspection & Drilling Regulations" Department of Education - Accident Prevention Course, Edmonton October 16, 1969
V. Jones	"Measurement with Orifice & Fluid Meters" PITS - Lease Operators Course, Edmonton November 6, 1969
A. Casey	"History and Responsibilities of the Board" PITS - Lease Operators Course, Edmonton November 6, 1969
R. Switzer	"Government Regulations" PITS - Field Handling of Natural Gas Short Course, Calgary November 28, 1969

Author	Title of Technical Paper
G. C. Watkins and J. S. Rimell	"Population Projection Shows Growth" Alberta Business Journal May, 1969
J. R. Pow	"Core Storage in Western Canada" Bulletin of Canadian Petroleum Geology December, 1969
G. K. Billings, B. Hitchon and D. R. Shaw	"Geochemistry and Origin of Formation Waters in the Western Canada Sedimentary Basin, 2. Alkali Metals" Chemical Geology, 4(1969) p211



MAP OF
ALBERTA
SHOWING

DESIGNATED OIL AND GAS FIELDS, MAIN OIL AND GAS PIPE LINES, REFINERIES, GAS PLANTS, PRINCIPAL TOWNS AND CITIES

LEGEND

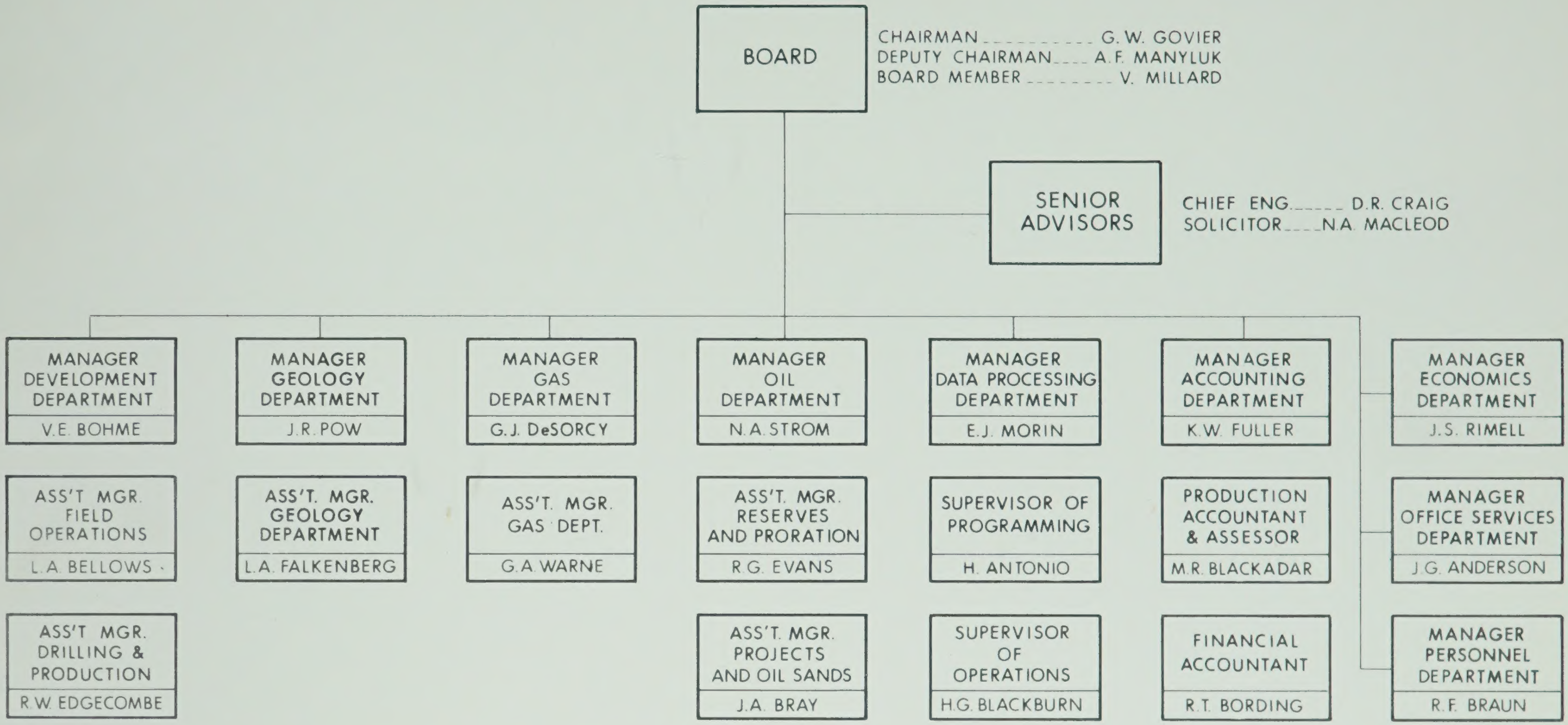
FIELD, MAINLY OIL	🟩
OIL REFINERIES	
OIL SANDS (area evaluated by Board)	
OIL PIPE LINES	—
FIELD, MAINLY GAS	🟥
GAS PLANTS	
GAS PIPE LINES	- - -

Note - Pipe line information has been obtained from the Oil and Gas Fields and Main Pipe Lines map published by the Department of Mines and Minerals, Edmonton; certain pipe lines have been deleted in congested areas..
- Figure by refinery or plant symbol denotes the number existing within a restricted area; the figure is omitted for single installations.
- Scale 1 inch - 40 miles

PREPARED BY OIL AND GAS CONSERVATION BOARD, CALGARY ALBERTA, REVISED TO APRIL, 1970

OIL AND GAS CONSERVATION BOARD

BOARD ORGANIZATION


BOARD
CHAIRMAN ____________ G. W. GOVIER
DEPUTY CHAIRMAN ____ A.F. MANYLUK
BOARD MEMBER ________ V. MILLARD
SENIOR ADVISORS
CHIEF ENG. ______ D.R. CRAIG
SOLICITOR ____ N.A. MACLEOD
MANAGER DEVELOPMENT DEPARTMENT
V.E. BOHME
ASS'T MGR. FIELD OPERATIONS
L.A. BELLOWS
ASS'T MGR. DRILLING & PRODUCTION
R.W. EDGECOMBE
MANAGER GEOLOGY DEPARTMENT
J.R. POW
ASS'T. MGR. GEOLOGY DEPARTMENT
L.A. FALKENBERG
MANAGER GAS DEPARTMENT
G.J. DeSORCY
ASS'T. MGR. GAS DEPT.
G.A. WARNE
MANAGER OIL DEPARTMENT
N.A. STROM
ASS'T. MGR. RESERVES AND PRORATION
R.G. EVANS
ASS'T. MGR. PROJECTS AND OIL SANDS
J.A. BRAY
MANAGER DATA PROCESSING DEPARTMENT
E.J. MORIN
SUPERVISOR OF PROGRAMMING
H. ANTONIO
SUPERVISOR OF OPERATIONS
H.G. BLACKBURN
MANAGER ACCOUNTING DEPARTMENT
K.W. FULLER
PRODUCTION ACCOUNTANT & ASSESSOR
M.R. BLACKADAR
FINANCIAL ACCOUNTANT
R.T. BORDING
MANAGER ECONOMICS DEPARTMENT
J.S. RIMELL
MANAGER OFFICE SERVICES DEPARTMENT
J.G. ANDERSON
MANAGER PERSONNEL DEPARTMENT
R.F. BRAUN

APRIL 1, 1970